NOTES ON THE BUTTERFLIES OF ÖSTERGÖTLAND, SWEDEN

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INTRODUCTION AND BRIEF GEOGRAPHY

With a human population of eight and a half million, and an area approaching twice that of the UK, Sweden is a comparatively sparsely populated country. This means that even though half of Sweden's area is forested there is still a good range of habitats supporting a total of 113 species of butterflies (115 if *L. camilla* and *A. iris* are included, but *iris* has been recorded only once, and *camilla* is now extinct in Sweden, but seems to reappear from time to time in the south west).

Östergötland, with an area of 10,562 sq. km, is a county about the size of Yorkshire and is situated between Lake Vättern and the Baltic (Fig. 1). The central plains,

Fig. 1. Östergotland, shown by the hatched area.

consisting of rich clay soils, are fairly intensively cultivated. The less fertile areas to the north, south and east consist largely of thin soils and granite outcrops. Except for the mountains and tundra regions it can be said that Östergötland represents most of the different types of habitat to be found in Sweden; much in the same way as Dorset can be said to represent the English habitats. What makes this county particularly interesting are the limestone areas in the west and the associated basic soils,

as well as the special habitats offered by the archipelago along the east coast, where the effects of glaciation are especially obvious. Here there are expanses of smooth volcanic rock which make up the thousands of islands, the soil cover is generally thin, the pine trees are more stunted and sparse and the more open areas are rich in *Sedum* (foodplants of *apollo* and *orion*), as well as orchids. The obvious effects of the ice ages in the east is a reminder that the whole of Sweden has been sculptured by glaciation. There are pockets of grit and sand and basic soils may be found some miles from their original limestone source. This may explain the presence of some limestone-associated species like *C. minimus* and *M. cinxia* in areas far away from the nearest crop of limestone.

Vast tracts of land are strewn with huge boulders carried by glaciers and providing habitats for species such as *L. petropolitana*. In the final analysis, however, it is Man's effect on the environment that counts whatever the geological basis may be. Except for a few small isolated areas nothing in Östergötland has been left untouched. This means that there are practically no areas of ancient forest. Virtually all the forested areas are planted, cleared, then replanted. The more recent forestry methods have resulted in large areas of dense relatively sterile tracts of spruce, but as in Britain the latest trends are towards mixed or deciduous plantations. Clear felling is also being talked about as damaging because of the increasing problems caused by acid rain. Some of the older pine forests still remain scattered throughout the county, however. These provide the core to the Swedish enjoyment of the countryside. Apart from orienteering and cross-country ski-ing, a favourite pastime is bilberry and mushroom picking, which because of the sparse population, causes negligible damage. Such types of forest are good reserves for woodland butterflies as well as other insects including beetles, especially cerambycids.

The county's climate is interesting from an entomological point of view. Most winters are of the Continental type with average temperatures one or two degrees below freezing. This means that it can sometimes get as cold as −20 °C. Spring then only lasts a few weeks until the end of May, when a warm Continental type of summer is likely to follow, with temperatures over 20 °C until September. Most of the precipitation then occurs during the spring and autumn. Mild Atlantic winters do occur from time to time, the latest being 1988/89 and 1989/90.

Systematic list

About 70 species of butterfly are known in Östergötland. They are listed as follows, together with any comments drawn from my own observations made since I moved to Sweden in 1986.

P. machaon (L.) can be seen most years, mostly in the Baltic archipelago, where its foodplant is *Angelica archangelica* L. I have also come across it flying along roadsides in mixed woodlands.

P. apollo (L.) is now very rare and its decline may be associated with the effect of acid rain on its habitat in the Baltic archipelago. Although its foodplant, *Sedum maximum*, is found both on neutral and acid soils, acidification releases manganese which the larvae cannot tolerate when absorbed by the foodplant. This may explain why it (*ssp. linnaei*) is still common on Gotland, an island consisting almost entirely of limestone. Its close relative, *P. mnemosyne*, does not occur in Östergötland and is found only in two areas in Sweden; to the north west of Stockholm in Uppland and in Blekinge in the extreme south west of Sweden.

A. crataegi (L.) is quite common in the older more established mixed woodland areas, where its foodplant is rowan, *Sorbus aucuparia* L. 1989 was a good year for it.

P. brassicae L., *P. rapae* L., *P. napi* L., and *A. cardamines* L. The status of these common butterflies appears to be about the same as in the UK.

C. palaeno (L.) Compared with most of Sweden Östergötland is not rich in acid bogs, where this butterfly is found. The north of the county is more typical in having more coniferous forest and bogland containing its foodplant, *Vaccinium uliginosum* L. (bog whortleberry). It can appear as early as the beginning of June when the summers are hot and dry, as in 1989 and 1990.

G. rhamni (L.) is one of the most common butterflies in the sunnier patches of mixed and coniferous forests. It is also occasionally found in the more open and cultivated areas.

L. sinapis (L.) is a common woodland butterfly, especially in the old and more established pine forests. Two generations are usual in Östergötland and the most common foodplant seems to be bitter vetchling, *Lathyrus montanus* (L.).

L. populi (L.), is likely to be seen in the less disturbed mixed woodland areas wherever there are good stands of aspen, *Populus tremula* L., with some young trees. It is not common, and when the occasional one is seen, it is either flying 3–4 m above the ground, or it has come down to suck moisture and minerals along grit roads or on rotting carcasses. It flies only for a short period during mid summer.

N. antiopa (L.) appears to have become scarcer in recent years and is more readily seen along the Baltic coast. Several individuals may gather to suck sap oozing from an oak tree.

A. urticae (L.) is at least as common as it is in the UK, a succesion of generations during the summers of 1989 and 1990. The increasing nitrogen content of most soils in southern Sweden has encouraged the spread of nettles.

P. c-album (L.). Though not as common, it favours similar habitats to *L. sinapsis* and can appear as early as March, together with *G. rhamni*, though much more confined to territories.

V. cardui L. and *V. atalanta* (L.). Numbers vary from year to year. Entirely dependent on migration as they cannot overwinter in Sweden.

I. io (L.). Though well distributed throughout the county, for some reason it has become quite scarce, which raises several questions about its differences from other nettle-feeding species.

A. paphia (L.), *M. aglaja* (L.) and *F. adippe* (Schiff.). These woodland butterflies are still common in the older pine and mixed forests (*adippe* is called 'the common mother of pearl butterfly' when its name is translated from the Swedish). Dog violets, *Viola riviniana* Rchb., are common and except where the older stands of trees have been clear felled and replanted with spruce there is little evidence of a drastic decline so far. Smaller clearings appear, if anything, to encourage them: their foodplants still thrive and good sources of nectar in the form of various composites abound. Traditional forestry methods have ensured that these and other woodland butterflies have thrived in Sweden. Modern methods involving heavy machinery and dense conifer monoculture are unfortunately reducing the numbers of good forest habitat and this may be a threat to the future status of these butterflies.

F. niobe (L.) appears to be more common in the drier, more sparsely forested areas to the east of the county. It is not easy to distinguish from *adippe*.

I. lathonia (L.). 1990 was a good summer with successive generations May to September. Its status in Scandinavia is supported by immigrants from the south, though nucleus populations survive most Swedish winters.

B. ino (Rott.) is a common fritillary wherever there is damp meadow or marsh land in woodlands. The Swedes call it 'the meadowsweet butterfly', after its foodplant, *Filipendula ulmaria* (L.).

P. eunomia (Esp.)—ssp. *subargentata* and *B. aquilonari* (Stichel): though both these species are more widespread in northern Sweden, where *eunomia* is found as ssp. *ossianus*, in Östergötland and the south they are entirely confined to acid bogs, especially the larger ones and those that are less disturbed by ditching.

C. euphrosyne (L.), *C. selene* (Denis & Schiff.), and *M. athalia* (Rott.) are common throughout most of Östergötland, sharing the same biotopes as the other woodland fritillaries. *Athalia* is the most variable, some individuals being quite dark, while others have a varied distribution of markings. Traditional forestry methods involving the creation of clearings with minimal soil disturbance is vital for their survival.

M. cinxia (L.) is not uncommon round Omberg, a large granite outcrop by Lake Vättern; also in suitable dry habitats in the Baltic archipelago.

M. diamina (L.). Its status in Östergötland is uncertain, but colonies may still be found in old damp meadows in the wooded areas of the south. There are no reports in recent years.

M. britomartis (Assmann) can be found in old drier meadows in the eastern and southern parts of the county.

E. aurinia (L.) is very rare or absent in Östergötland, but was once found in the north east of the county.

H. semele (L.) is fairly common in the Baltic archipelago and similar rocky dry biotopes along the shores of the larger lakes.

O. jutta (Hübn.) is rare in the county, but found in some of the acid bogs of the north. It is more common in the north of Sweden. It has a 2-year life cycle and is more likely to be seen in the even years.

E. ligea (L.) is quite common and widely distributed in the county in the more established coniferous forests. It is very wary and difficult to photograph, except when settled on field scabious, *Knautia arvensis* (L.). Like *jutta*, it has a 2-year life cycle, and though seen every year is more numerous in the odd years; 1985 was especially good.

M. jurtina (L.) has declined as it has in Britain, but it is still found throughout the county where there is old meadowland, round the edges of ski-slopes, etc.

A. hyperantus (L.) is much more common than *jurtina*, it is found in most uncultivated moist grassy areas, round the edges of woods, roadsides etc.

C. tullia (Müller, 1764) is more readily found in marshy, rather than boggy areas as form *tullia* with small ocelli (Henriksen & Kreutzer, 1982), but according to Higgins & Riley they are likely to be form *demophile*. It is interesting to note, however, that there is considerable variation between individuals in one colony.

C. pamphilus (L.). Similar biotopes to Britain and common.

C. arcania (L.). This butterfly is common in Östergötland. It is found in the drier and more sheltered grassy areas round the edges of woods and in clearings. Like other members of its genus, it never settles with open wings.

P. aegeria (L.). Similar forms and habitat to those found in Britain. It is not common, but widespread throughout the county both in mixed and coniferous forest.

L. megera (L.) is rare, but sparsely distributed in the Baltic archipelago.

L. maera (L.) is common, and shares the same habitats as the woodland fritillaries, but it requires in addition a rocky and rather dry terrain. Often seen along woodland roads, where it takes up a rather linear territory of about 100 m, resting on the sun-warmed surfaces of rocks and boulders. This behaviour, and its later emergence, helps one to distinguish it from *petropolitana*.

L. petropolitana (F.) is a shy butterfly with a much more confined territory than *maera*. A boulder-strewn or rocky environment in or surrounded by well-spaced pine trees is a typical habitat. Emerges in May, at about the same time as *sinapis* and about a month earlier than *maera*. Not as common as *maera*.

L. achine (Scop.). Surveys carried out by the Östergötland Entomological Society have shown that this rare butterfly has its stronghold in only a few sites to the south of Linköping on the Swedish mainland. (Form *rambringi* is found on the island of Gotland.) Its behaviour is still being studied, but *Carex montana* L. appears to be the choice foodplant. In Östergötland its habitat is confined to mature oak woodland mixed with other deciduous trees and hazel coppice, among which the butterfly is usually found. The habitat is maintained by means of controlled cattle grazing. Unfortunately a reduction of this type of grazing land has led to its decline during the last 20 years and recent dense conifer plantations have acted as barriers in the event of possible expansion. Efforts are being made to provide landowners with financial incentives to preserve and maintain the remaining habitats which are the last strongholds of several rare insects. See Plate IV, Figs 3 and 4.

H. lucina (L.). Work is also being carried out to map out the distribution of this fairly rare butterfly. It is found in small colonies in central and western Östergötland, though its foodplant, the cowslip, *Primula veris* L. is much more common.

T. betulae (L.). In southern Sweden *betulae* is likely to be found wherever there are good numbers of blackthorn bushes, *Prunus spinosa* L., especially in the less forested areas. It can be seen during August but is difficult to photograph in hot dry summers when there is a shortage of flowers when it flies.

Q. quercus (L.) is well distributed wherever there are oaks.

S. w-album (Knoch) is usually seen where *Ulmus glabra* Huds. is well established and is therefore well distributed in the county.

C. rubi (L.) is common in non-cultivated areas, as in the rest of Sweden.

L. phlaeas (L.) is widespread in central and southern Sweden.

H. virgaureae (L.) is common in most non-cultivated areas near forests. Probably southern Sweden's most common copper.

P. hippothoe (L.) is declining, but colonies can still be found in damp, undisturbed clearings in forests in the county where there are plenty of wild flowers. Unfortunately modern forestry and agriculture methods are threatening this type of habitat and may be causing the decline of this species.

C. minimus (Fuess.) is quite common along the shores of Lake Vättern where there are dry slopes with kidney vetch. Old disused gravel pits where the foodplant occurs are also typical habitats in Östergötland.

C. argiolus (L.) is not hard to find in most unspoilt mixed forested areas. As holly and ivy are absent in the county, bilberry, buckthorn, and heather are the foodplants. The first generation appears in April and May, then a partial second in July.

G. alexis (Poda) is sparsely distributed along the Baltic coast and in the south of the county in suitable dry habitats.

M. arion (L.). There are a few colonies in the north east of the county. It is rare in Östergötland. (Two of its best strongholds in northern Europe are the Swedish islands of Öland and Gotland.)

S. orion (Pallas) is very rare, but has recently been found in the Baltic archipelago to the north east.

P. argus (L.) is common in drier undisturbed habitats, usually near woodland.

L. idas (L.) is fairly common, especially in the east, where there are dry acid soils and wooded heaths.

L. argyrognomon (Bergstr.) In Sweden, this rare species is found only in north east Smaland and the adjoining part of Östergötland, where there are good patches of *Astragalus glycyphyllos* L. Found in colonies.

V. optilete (Knoch). Like *palaemon*, which shares its foodplant, (*Vaccinum uliginosum* L.) it is found in most acid bogs. Occasionally it strays well away from its habitat.

E. eumedon (Esp.). Likely to be found in more open deciduous woodlands, where there are plenty of wild flowers as well as its foodplant, *Geranium sylvaticum* L., or *G. sanguinum* L. by Lake Vättern.

A. artaxerxes (F.). Widespread on most dry undisturbed open habitats rich in wild flowers, including the most likely foodplant in Östergötland, *Geranium*.

C. semiargus (Rott.). In most years it is common near cultivated or grazed land where there are damp grassy areas with vetches.

P. amanda (Schneid.). This large silvery blue butterfly is usually to be found where there are plenty of wild flowers, including its foodplant *Vicia cracca* L. Common in southern Sweden, but appears to have declined in 1989 and 1990. In Östergötland about 30% are ssp. *azurea*, which are easily distinguished from f. *amanda* by noting that half of the upper surfaces of female's wings are blue whereas those of the remaining 70% are dark brown.

P. icarus (Rott.). Status and individual variation about the same as in the UK.

P. malvae (L.). Common in most of the forested areas of the county where there are plenty of spring wild flowers.

P. alveus scandinavicus (Strand). Rare; said to occur in dry habitats on the shore of Lake Vättern and along the Baltic, but there are no recent records.

E. tages (L.). Though often seen together with *malvae*, it is less common and prefers drier habitats.

T. lineola (Ochs.). More common in the county than suggested by the distribution map according to Henriksen and Kreutzer (1982). Favours sunny areas round woodlands.

O. venatus (Turati). Common and well distributed throughout the county.

H. comma (L.) is common in Östergötland. It is found in the less disturbed forest clearings, especially by paths and roadsides, as well as in the more open habitats, similar to the downs of southern England.

Summary and acknowledgements

This survey of the status of the butterflies of Östergötland is based on notes taken during my residence in Sweden, together with comments from members of the Östergötland Entomological Society, especially Magnus Wadstein and Kjell Antonsson, to whom I am grateful.

Compared with most of the rest of Europe Östergötland, like Sweden as a whole, is still well endowed with relatively unspoiled habitats. Though forestry methods have greatly reduced the status of many species, there is an awareness that these methods must not be allowed to continue, not only because of what is happening to the rest of Europe, but because the Swedes themselves are proud of their wildlife.

References

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